PATENT

Norman C. Witbeck

TOWED TRANSPORT, LAUNCH AND RECOVERY RAFT

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 illustrates a perspective view of an embodiment of a towed raft according to the present invention;

Figure 2 illustrates a top view of an embodiment of a towed raft according to the present invention;

Figure 3 illustrates a front view of an embodiment of a towed raft according to the present invention;

Figure 4 illustrates a side view of an embodiment of a towed raft according to the present invention; and

Figure 5 illustrates a perspective view of another embodiment of a towed raft according to the present invention.

DETAILED DESCRIPTION OF EMBODIMENTS OF THE INVENTION

Embodiments of a towed raft **10** for transport, launch and recovery of a marine vessel **12** are shown in Figures 1-5. Referring to Figures 1 and 2, in one embodiment, the towed raft **10** comprises a generally U-shaped floating frame **14** having an open end **16**, and a spine and rib assembly **18** connected thereto. A receiving area **20** is generally defined laterally by the floating frame **14**, and upwardly by the spine and rib assembly **18**. During use, the receiving area **20** is

also downwardly defined by the level of water (not shown) on which the towed raft **10** is located for use. The receiving area **20** is configured to receive a marine vessel, **12** therein, substantially through the open end **16** of the floating frame **14**.

In one embodiment, the receiving area **20** has a longitudinal centerline **22** substantially aligned with the longitudinal axis of the towed raft **10**. In other embodiments, the spine and rib assembly **18** comprises a spine **24** upwardly spaced from the floating frame **14** and substantially aligned with the longitudinal centerline **22**. In yet other embodiments, the assembly **18** further comprises a plurality of ribs **26** that connect the spine **24** to the frame **14**. In yet other embodiments, the ribs **26** extend generally outwardly and downwardly from the spine **24** to the floating frame **14**. One or more lifting devices **28** may be secured to the towed raft **10**. In one embodiment, each lifting device **28** is adapted to lift, lower and retain a marine vessel **12** relative to the receiving area **20**. In other embodiments, the lifting devices **28** are able to retain a marine vessel **12** within the receiving area **20** having an underside clearance from the water level of between about **10** inches and about **30** inches.

As shown in Figure 2, the floating frame **14** in one embodiment comprises a pair of spaced-apart floats **30** connected by a cross brace **32** at a forward end **34** of the frame **14** that is opposite the open end **16**. In other embodiments, the floats **30** are substantially parallel. In yet other embodiments, the longitudinal centerline **22** of the receiving area **20** is substantially equidistant between the floats **30**.

Each float **30** may have construction as desired suitable for the purposes of the present invention. In one embodiment, each float **30** comprises a pontoon hull float. In other embodiments, each float **30** comprises a catamaran hull float. In yet other embodiments, each float **30** comprises a hull manufactured of aluminum or fiberglass material.

As shown in Figures 2-5, the floats **30** may be adapted as desired for use of the towed raft **10**. In one embodiment, one or both floats **30** comprise a substantially flat upper surface **36** adapted for occupancy by one or more crew members (not shown) manning the towed raft **10**. The flat upper surfaces **36** have an inside perimeter **38** adjacent to the receiving area **20** and an outside perimeter **40** generally on the outside of the towed raft **10**. In other embodiments, at least one generally upstanding railing **42** extends substantially along the inside perimeter **38** of each float **30** having a flat upper surface **36**. In yet other embodiments, at least one generally upstanding railing **42** extends along at least one portion of the outside perimeter **40**. In yet other embodiments, generally upstanding railings **42** are configured according to rules, regulations or other standards in the marine industry.

Referring now to Figures 1 and 2, the cross brace **32** at the forward end **34** of the frame **14** may have any configuration suitable for rigidly connecting the pair of floats **30** in the floating frame. In one embodiment, the cross brace **32** comprises a rigid flat or multi-faceted sheet **44** extending between the floats **30** and secured thereto at opposite ends **46** of the sheet. In other embodiments, the

sheet **44** has a length sufficient to space the floats **30** apart sufficiently to define the receiving area **20** sized as desired to receive a marine vessel **12**. In yet other embodiments, a tow winch **48** is secured to the cross brace **32**, the tow winch **48** being adapted to tow a marine vessel **12** into position for recovery of the vessel into the receiving area **20** prior to lifting by the lifting device **28**.

Referring now to Figures 2-4, the spine and rib assembly **18** upwardly defines the receiving area **20**. In one embodiment, the spine **24** comprises a generally longitudinal beam **50** spaced above the floating frame **14** and substantially aligned with the longitudinal centerline **22**. In other embodiments, at least two pairs of ribs **26** connect the spine **24** to the floating frame **14**. In yet other embodiments, the ribs **26** in each pair extend generally outwardly and downwardly from the spine **24** on laterally opposite sides **52** of the spine. In yet other embodiments, the pairs of ribs **26** comprise an arched connection of the spine **24** to the floating frame **14**. In yet other embodiments, at least one lifting device **28** is provided corresponding to each pair of ribs **26**.

A lifting device **28** can be any device suitable for releasably connecting to a marine vessel **12** and launching or recovering and retaining the vessel relative to the receiving area **20**. In one embodiment, a lifting device **28** comprises a cable **54** having a hook or other connecting device **56** at a distal end **58** of the cable and a connected end **60** wound about a reel **62**. In other embodiments, the reel **60** has operative controls **64** for winding and unwinding the cable **54** about the reel. In yet other embodiments, operative controls **64** comprise a manual winch or a

motorized winch. In yet other embodiments, operative controls **64** comprise at least one hydraulic lift cylinder. In yet other embodiments, each lifting device **28** is adapted to raise and lower loads of up to about 7,500 pounds.

A lifting device **28** may be secured to the spine **24** by any suitable means at any suitable position for the purposes of the present invention. In one embodiment, each lifting device **28** is secured to the underside **66** of the spine **24** in spaced relation to each other lifting device, if any. In other embodiments, each lifting device **28** is secured within the spine **24** and the cable **54** extends generally downwardly from the underside **66** of the spine. In yet other embodiments, rigid support elements **68** are secured to the spine **24** generally adjacent the location of each lifting device **28**. The support elements **68** may be adapted to provide additional structural support to the spine **24** during launch, recovery, lifting and retention of a marine vessel **12** by the lifting devices **28**.

The dimensions of a towed raft **10** according to the embodiments of the present invention are determined according to the towing limitations of a user of the raft and according to the size of the marine vessel **12** used in connection with the towed raft. In one embodiment, the towed raft **10** has a length of between about 25 feet and about 40 feet. In other embodiments, the length is about 33 ½ feet. In yet other embodiments, the towed raft **10** has a width of between about 8 feet and about 15 feet. In yet other embodiments, the width is about 12 ½ feet. In yet other embodiments, the towed raft **10** has a dry-dock height of between about

6 feet and about 15 feet. In yet other embodiments, the dry-dock height is about 8 ¾ feet.

The marine vessel **12** used in connection with the embodiments of the towed raft **10** may be any vessel having short-range uses for which transport to the location of such uses is desirable. In one embodiment, the marine vessel **12** comprises a swimmer delivery vehicle **70**. In other embodiments, the swimmer delivery vehicle **70** has a passenger capacity of between **2** and **10**.

As shown in Figures 1, 3 and 5, in one embodiment, the towed raft **10** has one or more tow-line connection points **72** located generally at the forward end **34** of the floating frame **14**. In other embodiments, tow-line connection points **72** are located on each float **30** adjacent opposite ends **46** of the cross brace **32**. In yet other embodiments, the tow-line connection points **72** are configured to receive distal connections **74** from a tow line **76** extending from a tow craft (not shown). In yet other embodiments, the towed raft **10** may be towed by the tow craft at a speed up to about 18 knots with a marine vessel **12** retained within the receiving area **20**.

For lifting devices **28** comprising non-manual operative controls, a power source (not shown) may be provided for powering the lifting device. In one embodiment, the power source comprises a battery-stored power source. In other embodiments, the battery-stored power source has a power storage capacity sufficient for at least two repetitions of a set of lowering and lifting a marine vessel **12** relative to the receiving area **20**.

As shown in Figure 4 in broken-line form, in some embodiments of a towed raft **10**, it may be desirable to provide mechanical means **78** for propelling the raft **10** along a body of water (not shown). In one embodiment, mechanical means **78** for propelling the raft **10** comprise either a marine outboard motor, a water jet motor, or a diesel motor that is operatively connected to a propeller assembly. In other embodiments, steering means **80** for navigating the towed raft **10** with mechanical means **78** for propelling it are also provided. In yet other embodiments, the steering means **80** is mounted at the forward end **34** of the floating frame **14**.

The receiving area, **20** defined by the floating frame **14** and the spine and rib assembly **18** is configured to receive a marine vessel **12** therein. In one embodiment, the receiving area **20** has a height at the longitudinal centerline **22** from the bottom of the spine **24** to the level of the water between about 6 feet and about 12 feet. In other embodiments, the receiving area **20** has a width between the floats **30** of between about 8 feet and about 15 feet. In yet other embodiments, the receiving area **20** has a length from the cross brace **32** to the open end **16** between about 15 feet and about 32 feet. In yet other embodiments, the receiving area **20** has dimensions of about 6 feet in height at the longitudinal centerline **22**, about 8 feet wide, and about 28 feet long. In yet other embodiments, the receiving area **20** has a volumetric capacity of between about 720 cubic feet and about 5,760 cubic feet. In yet other embodiments, the receiving area **20** has a volumetric capacity of about 1,344 cubic feet.

In operation, a marine vessel **12** is retained within the receiving area **20** with clearance above the water level of about 24 inches. The towed raft **10** is then towed by a tow craft to transport the vessel **12** to a desired location. At that location, launch of the vessel **12** is achieved by generally simultaneously unwinding the cables **54** of each lifting device **28** using the operative controls **64**. In one embodiment, a control panel **82** is provided with each lifting device **28** having at least two controllers **84**, one for extending (unwinding or lowering) the cable **54**, the other for retracting (winding or lifting) the cable **54**. The cables **54** are extended until the vessel **12** is substantially buoyantly supported in the water. The hooks, **56** at the distal ends **58** of the cables, **54** are then disconnected from the vessel **12**. In one embodiment, launch may occur while the towed raft **10** is being towed by a tow craft at up to about 2 knots. The vessel **12** then navigates clear of the towed raft **10**.

Recovery of the vessel **12** is achieved by positioning the vessel such that the lifting device cables **54** and hooks **56** may be reconnected to the vessel. In one embodiment, a recovery line **86** extending from the tow winch **48** secured to the cross brace **32** is connected to a tow bridle (not shown) at the forward end of the vessel **12**. The tow winch **48** is operated to position the vessel **12** generally within the U-shaped floating frame **14** so that the cable hooks **56** may be reconnected to the vessel. The vessel **12** is then lifted out of the water by the lifting devices **28**. In one embodiment, recovery may occur while the towed raft **10** is being towed by a tow craft at up to about 2 knots.

One or more crew members (not shown) may man the towed raft **10** for achieving appropriate launch and recovery activities as described above. Crew members generally remain on the substantially flat upper surfaces **36** of the floats **30**. Railings **42** are provided for preventing unintentional entry into the receiving area **20** or for holding onto by crew members as the towed raft **10** floats on a body of water.

While specific embodiments of the invention have been shown and described herein for purposes of illustration, the protection offered by any patent which may issue upon this application is not strictly limited to the disclosed embodiments; but rather extends to all structures, steps and arrangements which fall fairly within the scope of the claims which are appended hereto: